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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/573,449	01/19/2007	Akira Takaguchi	1082/HIROSE	2452
27649	7590	08/02/2011	EXAMINER	
MICHAEL TOBIAS 1629 K ST NW SUITE 300 WASHINGTON, DC 20006			MEHTA, MEGHA S	
			ART UNIT	PAPER NUMBER
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			08/02/2011	PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

**Office Action Summary**

Application No.

10/573,449

Applicant(s)

TAKAGUCHI ET AL.

Examiner

MEGHA MEHTA

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 04 April 2011.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 9,11-17,20-27 and 29 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 9,11-17,20-27 and 29 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)         | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)         | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date. _____  | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on April 4, 2011, has been entered.

### ***Declarations***

2. The Garris declaration under 37 CFR 1.132 filed February 28, 2011, is insufficient to overcome the rejection of claims 9, 11-17 and 20-28 based upon Kabe in view of Gerstenberg as set forth in the last Office action because:

Regarding statement 1, Mr. Garris states that he does not believe the pump of Gerstenberg to be suitable for solder. However, this is not the combination that the Examiner made. The Examiner is only importing the number of blades of Gerstenberg into the solder bath pump of Kabe. The Examiner is not suggesting that one should use Gerstenberg's tool to pump solder.

Regarding statement 2, Mr. Garris states that there is no reason to expect that a pump designed for high viscosity fluids is appropriate for low viscosity fluids. However, as stated above, it is not the entire pump, only the blades, that have been imported from Gerstenberg into Kabe. Furthermore, Gerstenberg does not state that the reason for multiple blades is to pump fluids of a higher viscosity. Therefore, there is no reason to assume that a multiple-bladed pump would not be appropriate for pumping a lower viscosity fluid like solder. Additionally, one does

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not need to have the same reason as a teaching to use a particular feature. Although Gerstenberg uses multiple blades in order to cool the fluid, another may use multiple blades in order to keep the fluid heated, particularly when the blades are metal and heat-conductive.

Regarding statement 3, Mr. Garris states that the number of vanes and helix turns may not be related to the efficiency of a pump. However, the Examiner believes that it is reasonable to expect that the number of vanes and helix turns would affect the flow of the material within the pump based on increased surface area at the very least. It would then be possible through routine experimentation to determine what number of blades in a pump resulted in the best flow.

Regarding statement 4, Mr. Garris states that the amount of work done by the pump is not dependent on the number of blades. However, as stated above, the Examiner believes that it is reasonable to expect that the number of vanes and helix turns would affect the flow of the material within the pump based on increased surface area at the very least. It would then be possible through routine experimentation to determine what number of blades in a pump resulted in the best flow.

3. The Ichikawa declaration under 37 CFR 1.132 filed April 4, 2011, is insufficient to overcome the rejection of claims 9, 11-17 and 20-28 based upon Kabe in view of Gerstenberg as set forth in the last Office action because: Ichikawa discusses the unexpected results found from a four-bladed pump that is not seen in one and two blade pumps. However, US 5,961,212 Haegeman teaches that altering the number of blades, specifically increasing the number of blades, increases the flow rate of the material. Therefore, it would be expected for the 4 blade pump to have a greater wave height than a 1 blade pump.

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***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 9 and 11-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 62-259665 Kabe in view of WO 03/048579 Gerstenberg (refer to US 7,165,933 for translation).

Regarding claim 9, Kabe teaches a wave soldering tank **2** comprising a soldering tank body for housing molten solder **8**, a solder feed chamber disposed within the soldering tank body and having an inlet disposed below the level of molten solder and an outlet disposed above the level of molten solder in the soldering tank body and a screw-type pump **23** comprising an impeller having a rotatable hub and blades secured to the hub disposed in the inlet so as to draw molten solder into the solder feed chamber through the inlet and discharge molten solder through the outlet (figure 1 and abstract).

Kabe does not teach a multiple blade screw with at least four helical blades.

Gerstenberg teaches a multiple-blade screw-type pump has at least 4 helical blades (column 3, lines 63-67) enclosed in a casing that is used to transport a viscous liquid. While Gerstenberg's apparatus is outside Kabe's field of endeavor, it is analogous because both use screw pumps enclosed in cylindrical casings for forcing a viscous liquid through a pump to move it from one location to another. "Thus a reference in a field different from that of applicant's endeavor may be reasonably pertinent if it is one which, because of the matter with which it

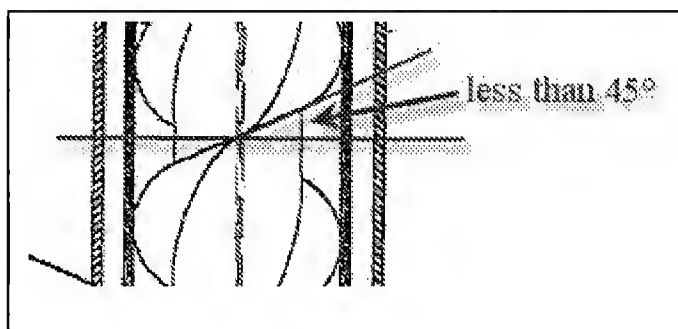
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deals, logically would have commended itself to an inventor's attention in considering his or her invention as a whole," (MPEP 2141.01 Section I).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to include the multiple-blade screw pump with at least four helical blades of Gerstenberg in the method of Kabe because the multiple-blade pump more efficiently and effectively transports the fluid than would a single-blade pump.

Regarding claim 11, Gerstenberg teaches that each of the blades overlaps an adjoining one of the blades when the blades are viewed in the axial direction of the impeller (figure 1).

Regarding claim 12, Gerstenberg teaches that the blades are provided at equal intervals in the circumferential direction of the hub (column 3, line 63 -- column 4, line 4), each blade extending around the hub by



at least 120° between first and second ends of the blade (figure 1).

Regarding claim 13, Gerstenberg teaches that each of the blades is sloped by at most 45° with respect to a plane perpendicular to a rotational axis of the hub (shown in figure 1 above).

Regarding claim 14, Kabe teaches that the solder feed chamber comprises a partition 6 which divides the interior of the soldering tank body into an upper and lower portion, the inlet comprises an opening formed in the partition (figure 1), and the pump includes an impeller and a cylindrical casing disposed in the inlet and surrounding the impeller, the impeller being rotatably disposed in the casing so as to transport molten solder in an axial direction of the casing (figure 2).

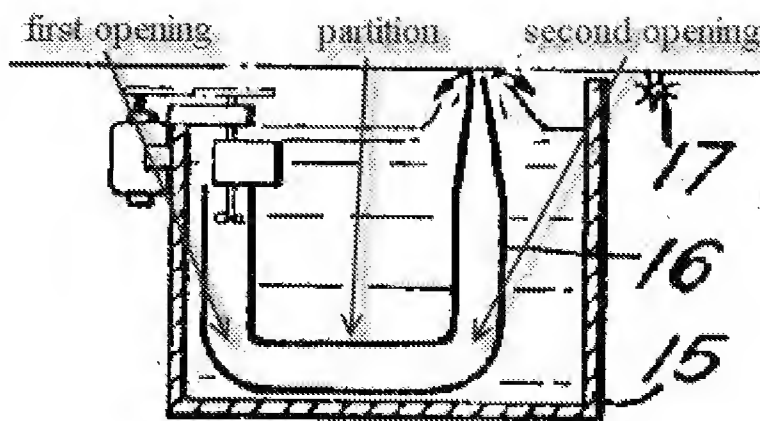
Regarding claim 15, Kabe teaches that the solder feed chamber includes a duct which extends upwards from the partition and a nozzle disposed at an upper end of the duct and extending above the surface of molten solder in the soldering tank body (figure 1).

Regarding claim 16, Kabe teaches that a lower end of the impeller extends below a lower end of the casing (figure 2). Kabe does not explicitly teach the extension amount. However, it would have been within the purview of one of ordinary skill in the art at the time of the invention to decide how far the lower end should extend based on the desired flow path and bath dimensions.

Regarding claim 17, Gerstenberg teaches a clearance between the casing and the impeller is 0.1-1mm (column 4, lines 22-25).

6. Claims 20-27 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 3,407,984 Walker in view of US 5,961,212 Haegeman.

Regarding claim 20, Walker teaches a wave soldering tank **20** comprising a soldering tank body for housing molten solder, a horizontal partition extending across the tank body below the level of molten solder in the tank body, the partition having first and second openings horizontally spaced from each other, a bowl-shaped guide secured to a lower side of the partition and having curved surfaces which are curved directly beneath the first and second openings for guiding fluid beneath the first and second openings, a nozzle **21** having a lower end in fluid communication with the second opening



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in the partition and an upper end disposed above the level of molten solder in the tank body, and a pump having an impeller disposed so as to draw molten solder downwards through the first opening into a space between the partition and the bowl-shaped guide (figure 1 above).

Walker does not teach a multiple-blade screw-type pump. Haegeman teaches a method of delivering water with a multiple blade screw-type pump that sucks in the fluid and forces it down (column 1, lines 7-15 and 28-31). One reading Walker as a whole would appreciate that Walker is not concerned with the type of pump used. It would have been obvious to one of ordinary skill in the art at the time of the invention to substitute the pump of Walker with the pump of Haegeman because Haegeman's pump increases the flow rate of the fluid (column 1, line 66 - column 2, line 1).

Regarding claim 21, Walker does not teach the impeller being disposed in the first opening of the partition. However, it would have been obvious to one of ordinary skill in the art at the time of the invention to include the impeller in a lower position than that shown in Walker because this gives the fluid less time and space through which it can lose energy and speed on the way to the nozzle, resulting in a solder flow with more force.

Regarding claim 22, Haegeman teaches that the impeller includes at least four helical blades (column 1, lines 63-65).

Regarding claim 23, Walker teaches a duct extending upwards from the partition above the second opening and communicating between the second opening and the lower end of the nozzle (figure 1).

Regarding claim 24, Walker teaches that there is no flow straightening plate in the wave soldering tank between the pump and an interior of the nozzle.



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Regarding claim 25, Walker teaches a wave soldering tank **20** comprising a soldering tank body for housing molten solder, a nozzle **21** having an upper end disposed above a level of molten solder in the tank body and a lower end, a pump having an impeller disposed in the tank body below the level of molten solder in the tank body, and a casing surrounding the impeller and having a lower end fluidly communicating with an interior of the nozzle along a flow path extending from the casing to the interior of the nozzle with no flow straightening plate in the flow path (figure 1).

Walker does not teach a screw-type pump with at least four helical blades that are overlapping when viewed in the axial direction of the impeller. Haegeman teaches a method of delivering water with a four blade screw-type pump that sucks in the fluid and forces it down (column 1, lines 7-15 and 63-65). Each of the blades are overlapping an adjoining one of the blades when the blades are viewed in an axial direction of the impeller (figure 5). One reading Walker as a whole would appreciate that Walker is not concerned with the type of pump used. It would have been obvious to one of ordinary skill in the art at the time of the invention to substitute the pump of Walker with the pump of Haegeman because Haegeman's pump increases the flow rate of the fluid (column 1, line 66 - column 2, line 1).

Regarding claim 26, Walker teaches that each curved surface is curved from a lower side of the partition to directly beneath one of the first and second openings (figure 1).

Regarding claim 27, Walker teaches that each of the curved surfaces comprises an end wall of the guide (figure 1).

Regarding claim 28, Walker teaches that the bowl-shaped guide is disposed inside the tank body between the partition and a bottom inner surface of the tank body (figure 1).

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***Response to Arguments***

7. Applicant's arguments filed April 4, 2011, have been fully considered but they are not persuasive. Applicant argues, as in the Garris declaration, that Gerstenberg is not an appropriate reference. However, as explained above and in previous Office Actions, Gerstenberg is applicable to the field of endeavor because both Gerstenberg and the invention are pumping liquids.

Gerstenberg need not teach why he chose a particular number of blades. Gerstenberg need not have the same reason for having multiple blades than that of the instant invention. Gerstenberg need not be pumping the same material as that of the instant invention. The point is that Gerstenberg is teaching multiple blades. It would not be unusual for one of ordinary skill in the art to look outside of the solder bath art, to other pumping devices, in order to try a different number of blades.

8. Applicant's argument regarding unexpected results are moot because the combination of Kabe and Gerstenberg, and that of Walker and Haegeman both teach a four-bladed screw-type pump for pumping solder in a solder bath.

9. Applicant's arguments with respect to claims 20-27 and 29 have been considered but are moot in view of the new ground(s) of rejection of Walker in view of Haegeman.

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MEGHA MEHTA whose telephone number is (571)270-3598. The examiner can normally be reached on Monday to Friday 8:30 am to 5:00 pm EST.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dave Sample can be reached on 571-272-1376. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/David R. Sample/  
Supervisory Patent Examiner, Art Unit 1783

/Megha Mehta/  
Examiner, Art Unit 1783